UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/886,307	06/19/2001	Don T. Batson	AMAT/5090/FET/FET/DV	5746

32588 7590 10/20/2006

APPLIED MATERIALS, INC.
P. O. BOX 450A
SANTA CLARA, CA 95052

EXAMINER	
LEE, RICHARD J	

ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 10/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/886,307	BATSON ET AL.	
	Examiner	Art Unit	
	Richard Lee	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-17,19 and 32-45* is/are pending in the application.

4a) Of the above claim(s) *34-45* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-17,19,32 and 33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Newly submitted claims 34-45 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: The particular claimed features of "obtaining a first image of a substrate during a first sampling period moving in a first direction and having a velocity changing during the first sampling period; determining a second sampling period for obtaining a second image of the substrate moving in the first direction based on the velocity change during the first sampling period; obtaining the second image of the substrate moving in the first direction; wherein obtaining the second image of the substrate further comprises obtain an image abutting the first image; wherein adjusting the exposure time of an image capturing device further comprises having an exposure time different than an exposure time utilized to obtain the first image" as claimed in claims 34-38; and the particular features of "moving a substrate in a vacuum processing system having a non-linear velocity profile thought an inspection zone; adjusting a sampling time used to obtain sequential images having a uniform image width of the substrate in a direction of travel; changing the exposure time in response to a change in rate of substrate travel between sampling periods; adjusting the sample time based on a metric of robot rotation" as claimed in claims 39-45, respectively are directed to inventions that are independent and distinct from the invention originally claimed.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 34-45 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

2. Claim 33 is objected to because of the following informalities: At claim 33, lines 19-20, "processing the optical signals into a second image; and integrating the first and second images" is redundant (see lines 17-18) and therefore should be deleted for clarity. Appropriate correction is required.

3. Claims 6 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6 and 7 depends from canceled claim 31 either directly or indirectly, respectively, and as such renders these respective claims indefinite.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-4, 8-12, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aloni et al of record (6,360,005) in view of Gomibuchi of record (5,305,391).

As for claims 1, 8-10, and 17, Aloni et al teaches a controller coupled to the receiver and transmitter comprising a processor and at least one substrate imaging program that when executed determines the trigger intervals for at least two trigger signals for the acquisition of at least two images on a substrate surface (see column 11, lines 5-10, column 28, lines 65-67, column 29, lines 1-3. Note: trigger signals are generated by a vision unit in response to a signal received from a stage controller which describes the position where the correct unit will allow for non-linear informalities), and wherein the at least two images have substantially equal width

in the first direction (i.e., scanned portions of the object are arranged as n x m two dimensional arrays, thereby providing images with substantially equal width in the first direction as claimed, see column 9, lines 36-48); transmitting one or more optical signals from the transmitter to the first and second image positions on the substrate surface and receiving at least two trigger signals (i.e., line times, see column 9, lines 37-48) at the receiver and receiving a portion of the one or more optical signals at the receiver from the first image position (see column 9, lines 37-48, column 11, lines 11-15. Note: a scanner is operative to electro-optically scan an object to be inspected and to output a gray level digital representation); interval measuring apparatus to determine the trigger intervals and also comprising of counters, clocks, or any combination thereof (see column 9, lines 49-54); processing the optical signals into an image and displaying the image (see column 9, lines 37-39, column 27, lines 5-7. Note: output a gray-level digital representation, and an operator display such as a CRT). However, this apparatus lacks determining trigger intervals for at least two trigger signals for the acquisition of at least two images on a substrate surface moving with non-linear motion in a first direction as claimed in claims 1 and 10. It is to be noted that Aloni et al does teach the particular use of a rotatable holder 316 for holding and rotating the piece to be inspected (see column 28, lines 45-48), but however is silent as to the type of rotational motion of the piece during inspection. Gomibuchi however teaches that prior art inspecting systems require an optical system which is complicated in construction (see column 1, lines 29-30 of Gomibuchi). To help alleviate this problem, Gomibuchi discloses "determining an integration interval for a second sensor of the camera corresponding to the non-linear movement of the substrate surface" (see column 2, lines 39-55, column 6, lines 12-24, wherein the non-linear movement is the rotation, the second interval is the

second point of time). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to take the apparatus disclosed by Aloni et al and add the inspection system taught by Gomibuchi in order to obtain an apparatus that can be easily constructed.

As for claims 2 and 11, Aloni et al teaches a receiver comprising a time domain integration camera, a line camera, a CCD camera or combinations thereof (see column 11, lines 11-15 of Aloni et al. Note: the CCD array of the scanner during a single line time).

As for claims 3 and 4, Aloni et al teaches of a transmitter comprising a broad band light source, a narrow band light source, or combinations thereof (see column 31, lines 25-28 of Aloni et al. Note: the upper illuminating system may employ a tungsten halogen lamp).

As for claim 12, Aloni et al teaches of a first trigger interval corresponding to a first motor rotation indicative of the first image position and the second trigger interval corresponding to a second motor rotation indicative of the second image position (see column 28, line 65 to column 29, line 19 of Aloni et al. Note: trigger signals for camera controller are generated by a vision unit in response to signals received from a stage controller, which is controller by the main controller which receives its data from the scanner (i.e., camera or receiving device)).

6. Claims 13-16, 19, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aloni et al and Gomibuchi as applied to claims 1-4, 8-12, and 17 in the above paragraph (5), and further in view of Kobayashi of record (6,388,414).

As for claims 13-15, Aloni et al teaches the rotation of the motors are step wise, linear or non-linear (Note: the rotations of the motors are necessary in order to get the required motion mentioned by Aloni et al, see column 28, line 65 to column 29, line 19 of Aloni et al). Aloni et

al in view of Gomibuchi do not teach of the trigger intervals being comprised of measuring the rotation of a motor as claimed in claim 13. However, Kobayashi does (see column 4, lines 12-32 of Kobayashi. Note: rotating the step motor a predetermined number of steps in order to get to a certain detection zone). Therefore, it would have been obvious to one skilled in the art to make the trigger intervals reliant on the rotation of the motor in order for the capturing of linear and non-linear motion.

As for claim 16, Aloni et al and Gomibuchi do not teach of trigger intervals that equal the number of steps and determine the image positions which comprises measuring the first number of steps of the stepper motor for the first interval and measuring a second number of steps of the stepper motor for the second trigger interval. However, Kobayashi does (see column 4, lines 14-24. Note: moves 8 steps to get to detection zone and then forward a predetermined number of steps in order to get to the target position). It would have been obvious to one skilled in the art to make the intervals a predetermined number of steps in order to keep the collection of data more precise and also the added benefit of the use of linear and non-linear motion.

Regarding claims 32, Aloni et al and Gomibuchi do not teach measuring a first time interval corresponding to the first image position and a second time interval for the second image position, providing a step time for each step of a stepper motor, determining the number of stepper motors steps for the first image position (i.e., initial position) and the number of stepper motors for the second image position (i.e., returns to initial position), summing the step time for each step of the stepper motor for the first and second image positions. However, Kobayashi does (see column 7, lines 12-23, column 7, line 55 to column 8, line 10. Note: when the camera is in exposure operation, rotates a certain predetermined number of steps, then reaches the stop

or close point, then starts the process over again). Therefore, it would have been obvious to one of ordinary skill in the art, having the Aloni et al, Gomibuchi, and Kobayashi et al references in front of him/her, would have had no difficulty in making the integration interval for the second sensor by making it the number of steps from the start trigger point or first sensor to the second sensor in order to give an integration time that is appropriate so as to not overlap the integration process of another set of images purposes as claimed.

Regarding claim 19, Aloni et al and Gomibuchi do not teach wherein the set time is equal to the time between each step plus a dwell time for each step. However, Kobayashi does (see column 7, line 55 to column 8, line 10. Note: using timing steps in order to control the exposure time of the camera and step time plus dwell time (i.e., stop time). Therefore, it would have been obvious to one skilled in the art to provide the step time being equal to the time between each step plus a dwell time for each step so as to be used as an exposure time or in order to get a consistent production line.

7. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aloni et al, Gomibuchi, and Kobayashi et al as applied to claims 1-4, 8-17, 19, and 32 in the above paragraphs (5) and (6), and further in view of Suzuki et al (US 2003/0199097 A1).

Regarding claims 33, Aloni et al, Gomibuchi, and Kobayashi teaches a method of substrate imaging comprising transmitting optical signals from a transmitter to the image position (i.e., line times, see column 9, lines 37-48 of Aloni et al); receiving at a first sensor of a time domain camera a portion of the optical signals from the at least one image position (see column 9, lines 37-48, column 11, lines 11-15 of Aloni et al. Note: a scanner is operative to electro-optically scan an object to be inspected and to output a gray level digital representation);

processing the optical signals into a first image (see column 9, lines 37-39, column 27, lines 5-7 of Aloni et al); receiving the optical signals at the second sensor from the at least one image position (i.e., as provided by sensor 9 of Gomibuchi, see column 2, lines 39-55, column 4, lines 33-52, column 6, lines 12-24); determining an integration interval for a second sensor of the time-domain camera positioned in a direction of travel corresponding to the non-linear movement of the substrate surface (see column 2, lines 39-55, column 6, lines 12-24 of Gomibuchi, wherein the non-linear movement is the rotation, and the second interval is the second point of time) by determining the number of stepper motor steps from a start trigger point to the second sensor (i.e., as provided by Kobayashi, see column 7, line 55 to column 89, line 10. Note: when the camera is in exposure operation, rotates a certain predetermined number of steps, then reaches the stop or close point, then starts the process over again) to obtain optical signals over an substantially equal sample distance as the optical signals obtained by the first sensor (i.e., scanner 10 of Aloni et al scans successive equally distance lines, thereby obtaining optical signals over an substantially equal sample distance as the optical signals obtained by the first sensor, see column 9, lines 37-48); receiving the optical signals at eh second sensor from the at least one image position (i.e., as provided by Gomibuchi, see column 2, lines 39-55, column 6, lines 12-24), processing the optical signals into a second image and integrating the first and second images (see column 9, lines 37-39, column 27, lines 5-7 of Aloni and column 2, lines 39-55, column 6, lines 12-24 of Gomibuchi).

The combination of Aloni et al, Gomibuchi, and Kobayashi do not particularly disclose determining an interval corresponding to at least one image position defining an image on a substrate surface moving linearly at a non-constant velocity as claimed in claim 33. However,

Suzuki et al discloses a substrate measuring method and teaches the conventional determination of an interval corresponding to at least one image position defining an image on a substrate surface moving linearly at a non-constant velocity (see sections [0018], [0038], [0039], [0041], [0043]). Therefore, it would have been obvious to one of ordinary skill in the art, having the Aloni et al, Gomibuchi, Kobayashi, and Suzuki et al references in front of him/her and the general knowledge of inspection of substrates, would have had no difficulty in providing the linear movement of a substrate surface while imaging and inspecting the substrate at a non-constant velocity as taught by Suzuki et al for the system of Aloni et al, Gomibuchi, and Kobayashi for the same more accurate measurement purposes as claimed.

8. The applicants argued at pages 11-12 of the amendment filed August 3, 2006 that "... Aloni does not teach ... wherein the at least two images have substantially equal width in the first direction, as recited in claim 1 ... or a method of substrate imaging that includes determining trigger intervals for at least two trigger signals for the acquisition of at least two images on a substrate surface moving with non-linear motion in a first direction, wherein the at least two images have substantially equal width in the first direction, as recited by claim 10...". The Examiner wants to point out that such arguments have been addressed in the above paragraph (5).

The applicants argued at page 12 of the amendment filed August 3, 2006 that "Gomibuchi also does not teach or suggest acquiring at least two images on a substrate surface moving with non-linear motion in a first direction, wherein a first trigger interval corresponds to a first image position and a second trigger interval corresponds to a second image position, and wherein the at least two image shave substantially equal width in the first direction ...". The

Examiner respectfully disagrees. It is submitted again that Gomibuchi teaches the desire to view objects, i.e. bottles, by rotating the bottle in a non-linear movement on a surface (see column 2, lines 39-55, column 6, lines 12-24), and such non-linear movement corresponds to the first direction as claimed. And, since Aloni et al teaches the particular scanning of portions of the object (see column 9, lines 37-48), such features read on wherein a first trigger interval corresponds to a first image position and a second trigger interval corresponds to a second image position, as claimed. Further, it is to be noted that Gomibuchi also teaches the particular acquisition of at least two images at times T1 and T2 (see column 2, lines 41-55, column 4, lint 53 to column 5, line 13). The invention is nevertheless rendered obvious in view of the combination of Aloni et al and Gomibuchi for the above reasons.

The applicants' arguments at pages 13-14 of the amendment filed August 3, 2006 concerning the rejection of claims 6-7, 13-16, 19, 21-26, and 31-33 have been addressed in the above paragraphs (5) to (7).

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Lee whose telephone number is (571) 272-7333. The Examiner can normally be reached on Monday to Friday from 8:00 a.m. to 5:30 p.m, with alternate Fridays off.

RICHARD LEE
PRIMARY EXAMINER

Richard Lee/rl

10/12/06